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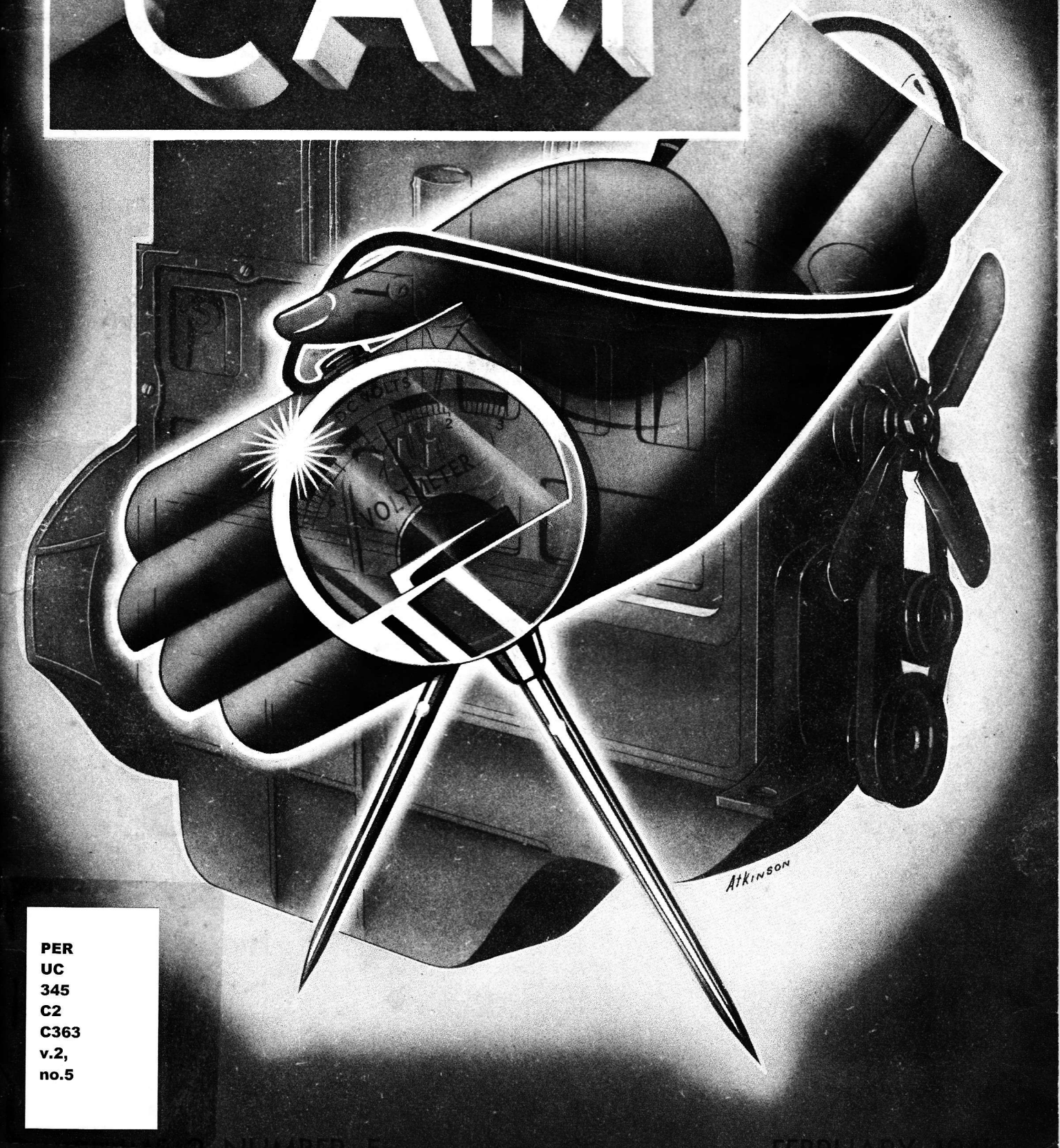
CAM



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no.5

VOL. 2 NUMBER 5 FEBRUARY 19

Exhaust

Is it asking a lot of a man to look and feel like a soldier when he has never fired a gun to kill and has only seen battles as training schemes?

Is it asking too much of a man to be bubbling over with esprit de corps when he has never dug a fox hole; when he's fighting the war behind the steering wheel of a supply truck, a work bench, or a lathe thousands of miles from the fighting fronts?

Many of us are apt to lose sight of the fact that the war for us is entering one of its most critical stages. It is much easier to put your heart and soul into a war when your home and everything you believe in is in jeopardy. There is a growing tendency in all of us to feel that we can now relax just a little and to forget that every minute of let-down on our part is a minute of grace for the Axis powers to strengthen their defences and prolong the war.

This is a danger which we must all meet and fight as individuals. It is easy to say to oneself at this point "the war is about over, so if I sneak a few days AWL or if I am careless about my job, it doesn't really matter a great deal." We must, at this stage, remember that every day the war goes on some of our pals are going to be killed. When we consider that, can we say that a little relaxing does not matter a great deal?

The Axis nations are playing for time, and it is up to each and every one of us to see that we do not make them a present of this last thing which they consider vital to their ultimate salvation.

CAM

FEBRUARY – 1945
VOL. 2 No. 5

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CAM is published monthly in the interests of Mechanical Maintenance, and directed to the non-commissioned officers and men of the Canadian Army.

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PER
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EDUCATION *free for the asking . . .*

HOW'S the old self confidence geared for civvy street? What's your standard of "know-how" for re-establishing yourself in a competitive civilian job—where there is no Sarge handy with all the answers? How does your ability stack up with your ambition?

Does this kind of question give you cause for a spell of painful cogitation—maybe a tremor or two of doubtful reflection—a slight chill of apprehension—or just a plain headache?

That's fine, soldier, because the symptoms aren't serious. In fact they prove health. It shows that you're not likely to be content to sit biting your nails, waiting till the day of the victory parade, before getting around to doing something about it. That is, not if you're as smart as nearly 140,000 other service men and women—and we think you are. We think that if you knew where and how you could get yourself—free for the asking—tuition in the many phases of the three R's, up to and including recognized Senior Matriculation standing, you'd be interested.

The Canadian Legion started this idea back at the beginning of the war, and here's enough of the story to start you thinking—and a suggestion of where to carry on from there.

As we said, it is a fact that since September 1940 nearly 140,000 service men and women in Canada, and many more thousands overseas, have been continuing their schooling by means of the Canadian Legion Education Services free Correspondence Courses. These lads and lassies, with an eye on their future, have decided that the sword is not **always** going to be mightier that the pen, and are making use of part of their spare time to assure that their education isn't going to be listed as unfinished business.

Started on a voluntary public subscription basis, its value was so well recognized that the work is now financed and administered by the Federal Department of National War Services. So, to Canada goes the honour of being the first country in the world to try this plan. The worth of this has since been recognized by other countries and the United States has gone in for it in a big way.

Along with the Correspondence Branch of the C.L.E.S. there is a Library Branch supplying books and reading material to all arms of the service; also a Rehabilitation Branch which provides information and guidance in handy booklet form and certain class room course materials dealing with some of our basic industries such as Forestry, Mining and Fisheries.

Approximately 70 courses are offered in the correspondence group—ranging from elementary Reading, Writing, Spelling and Arithmetic to Senior Matriculation levels. Add to these a list of Commercial and Business subjects, Technical and Vocational Courses and certain Special Service Courses and there is a very complete and varied programme of opportunities for learning.

A detailed list of these courses is wrapped up in a little booklet you can obtain, along with any other detailed information required, from your Educational Officer, or by writing CAM, Directorate of Mechanical Engineering, Department of National Defence, Ottawa.

You've got a new kind of world coming your way—a wiser and, we hope, smarter one. The way we see it, it's not going to hurt to become a bit smarter and wiser to meet it. Anyhow there are nearly 140,000 Canadians who agree—and have already done something about it. Next?

X Y Z

How'd you like to Meter?

Here's an introduction by Shorty Sirkit for wireless men or anyone else who's fool enough to be interested in electricity.

WHAT would happen to a milliammeter if you connected it across a 6 volt battery? O.K. so it's a foolish question—but while the smoke clears we're going to duck behind a desk and tell you it has been done, and by a wireless man at that.

The innards of D.C. ammeters and voltmeters are as plain as the writing on the washroom wall to all you electrical men, but before we get into the meaty part of our story, we're going to explain the mechanism quickly just in case some newcomers happen to be interested.

Ammeters are used to measure the **current** flowing through a circuit. Fig. 1 shows how the ammeter is connected to measure this current. Don't read on—look at Fig. 1 first. The construction of different meters vary but the one you're likely to encounter in the field is the moving coil type meter and looks something like the one shown in Fig. 2. Better glance at this picture too.

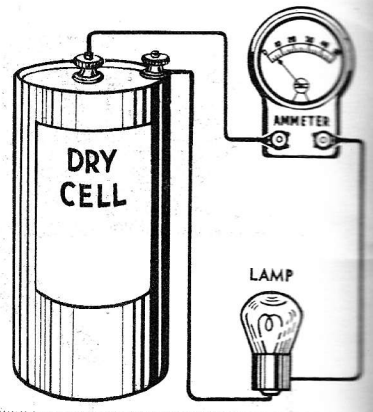

Fig. 1. An ammeter is always connected in series with the circuit, so it's plain to see that all the current flowing in the circuit must pass through the meter.

The current flowing through a circuit is measured by the electromagnetic action of the meter. What inhell's that?—well let's break it down. You remember the old magnetic law of attraction and repulsion. *Like poles repel and unlike poles attract.* You also remember (we hope you do, anyway) that magnetic lines of force surround any wire or conductor carrying current. Well, these are two of the things that make our little old ammeter function. When the meter is connected into the circuit current flows through one of the hair springs, from there it flows through the fine wire wound around the small armature and goes round and round, coming out at the other hair spring. While it's travelling around the armature coil the armature itself becomes a small electromagnet with a definite polarity. Because its polarity is the same as the polarity of the larger permanent magnet—(remember like poles repel) the flimsy little armature turns, carrying the ammeter needle with it. The stronger the current the stronger the magnetic push and pull—so all you need is a scale and you can read the amount of movement of the needle.

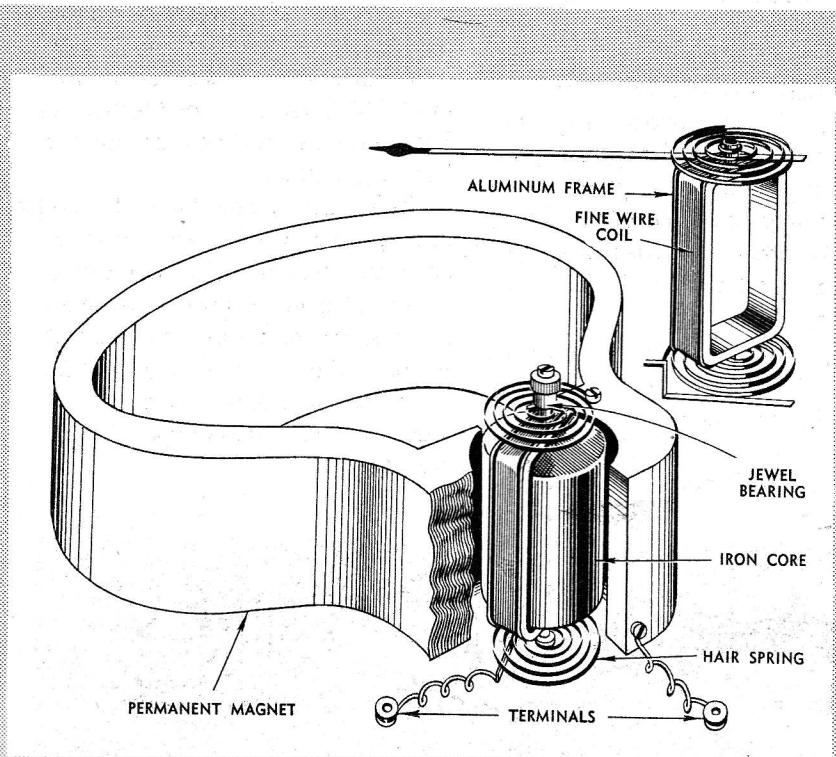

Fig. 2. The innards of a moving coil meter no less. Also an inset showing the armature assembly. See if you can trace the path of the current.

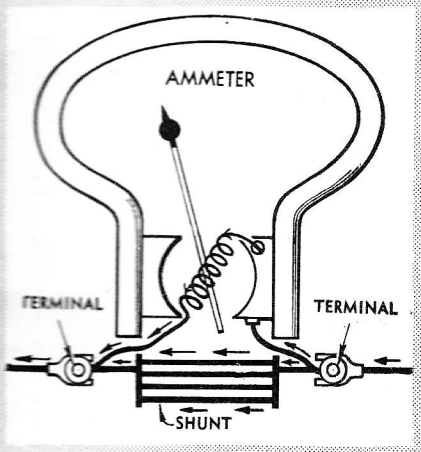

Fig. 3. Now there's two paths to handle the current. The resistance of the shunt is lower than the resistance of the fine wire around the armature—so most of the current flows through the shunt.

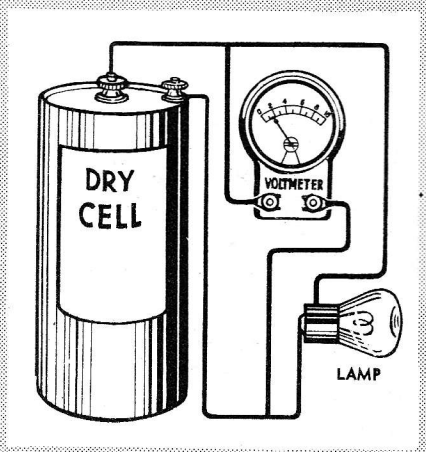

Fig. 4. That's right, voltmeters are connected in parallel and if they didn't have high internal resistance they would short the main circuit.

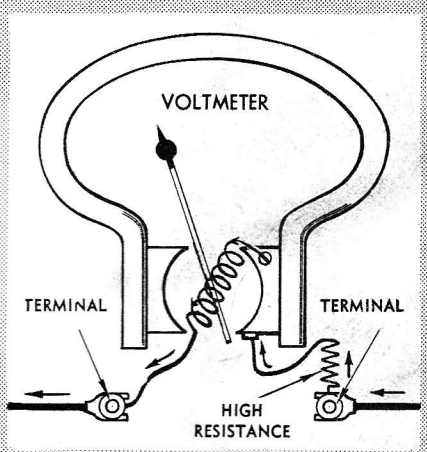

Fig. 5. The resistance, being very high in value, only allows a slight trickle of current to flow through the meter.

Due to the size of the very fine wire on the movable coil it stands to reason it wouldn't take very high current to burn it out. One ampere equals 1000 milliamperes, therefore a meter designed to carry .001 ampere for full scale deflection of the needle would have a maximum scale reading of one milliampere.

If we want to measure higher currents than this—some changes will have to be made besides changing the scale. So we add a low resistance in the form of a shunt which takes care of the excess current as in Fig. 3.

The value of the resistance of this shunt can be altered to fit the scale we want to use. In this way we can use the same meter to measure a fraction of an ampere or hundreds of amps, providing we install the correct size shunt to handle all of the current except the .001 amp that must flow through the coil for full scale deflection of the needle. Thus you can see how the same simple little mechanism can be used by merely changing the scale and the shunt. But you have to know what your doing—so don't grab the first milliammeter you see and start making it over.

Now that we're warmed up—what about voltmeters?

Strangely enough we use the same mechanism. The only difference is that the **shunt** is not used, a **resistor** is added, and the meter face is marked in volts. Voltage is measured

(Continued next page)

AN EXAMPLE

THE foregoing routine may have sounded quite elementary to wireless men who have spent months or years learning electricity. But even the experts make mistakes now and then. If you don't believe it we'll give you an example of one of those mistakes.

Test meters are mounted on the panels of most wireless sets for measuring the various voltages and currents within the set. They are also included in the Bulk Maintenance Spares. That you already know.

These meters are usually equipped with a one milliampere movement and their scales are usually marked off for several different readings. For example —the test meters in your No. 58 wireless sets are marked off to measure 0 — 34 volts, 0 — 30 milliamps and 0 — 300 volts. This means that different shunts and resistors must be used with the various scales. So far so good but — these shunts are mounted in the test panel and not in the meter itself.

When some bloke needs a meter to measure the voltage across his new automatic button polisher here's what may happen. He grabs a spare meter and, seeing it has a scale of 0-300 volts he thinks it's O.K. to measure up to 300 volts. It is too, providing the correct resistor is used. But this is often where the meter meets its last volt. Like we said, the shunts and resistors are not inside the meter in this baby and in his haste to check the button polisher this important factor has been forgotten. Result—one good meter gone up in smoke. The moral is obvious. Just because a meter has a scale of 0 to 300 volts, don't use it without first making sure that you are also using the correct resistor.

You may run into this difficulty anywhere, but it's a certainty you'll run into it on spare meters for fixed station transmitters and also in the following wireless sets:

W.S. Cdn. No. 19 Mk. 2 and Mk. 3.
W.S. Cdn. No. 58, No. 58 Mk. 1 and Mk. 1*/T
W.S. Cdn. No. 9 and No. 9 Mk. 1
W.S. Cdn. No. 52

They're your babies so take care of them.

For B.F.s

BREAKING IN ENGINES

Many moons ago we explained what a B.F. is. However, since our mail bag indicates there are many who did not see our first explanation we shall reiterate. So gather around while we unmuddle the term.

A B.F. is—but why should we bother to tell you? Surely you can think of two words that fit the caps better than a Brainy Fellow.

There are all kinds and degrees of B.F.'s. Some are B.F.'s all the time. Some are B.F.'s most of the time. Some are B.F.'s only occasionally.

The story that follows, while true, doesn't necessarily point to anyone in particular. It's about one of those occasional B.F.'s—and we believe that even other "only occasional B.F.'s" will find smething useful in it. Not that you need to own up to reading it. Palm it off on a friend by drawing his attention to some other article in the issue—he'll probably fall for the trap and read "for B.F.'s" without realizing it.

We shall be happy if no one owns up to reading it, so long as everyone learns a bit more about his vehicle and how to treat it.

" . . . . What is a B.F. ?"

B.F.s have several expensive toys, probably the most expensive being the engines in army vehicles. Just to show you what we mean we'll let you in on a true story—so true it's stranger than friction.

Not long ago we were talking to a beautiful C.W.A.C. driver (something we make a habit of doing upon any favourable opportunity). She was a nice girl, she enjoyed driving and was extremely proud of the way she handled her vehicle. She was also proud of the fact that in over two years of driving she had never so much as scratched a fender.

A few weeks before we talked to her, she had been issued with a brand spanking new vehicle. She, and several other drivers, had driven their old vehicles to the factory in convoy, and turned them in for new ones. "Then," she told us, "it was sure a great feeling to drive those new jobs back."

With idle curiosity we asked, "How fast did you drive your new vehicle on the way back?"

"Oh!" she smiled, "we were doing around 50 and 55 most of the way and the engine purred along smooth as a kitten."

"And why", we asked, "did you drive the new vehicles that you are so proud of, that fast."

"Well," she said, "we had to keep up with the convoy."

We didn't say anymore to her, except point out that during this first 200 miles, more damaging engine wear had been caused to that new motor than would normally occur in

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METER (Continued from page 83)

by connecting the meter as in Fig. 4.

Because the voltmeter is open to full battery voltage we must alter its resistance so it will take as little current as possible to move the meter needle. If we rob a lot of current from the main circuit to operate the meter our reading wouldn't be worth an atom of salt.

So we add a resistance as in Fig. 5. This resistance is in **series** with the meter coil which makes it a voltmeter instead of an ammeter. The value of the resistance is very high and must be calibrated so it will allow just enough current to trickle through the meter to give full scale deflection of the needle. The same meter mechanism can be used to measure low voltage or high voltage but the higher the voltage to be measured, the higher must be the value of the resistance. Thus, by changing the scale on the meter face and the value of the resistance, the meter can be made to measure any voltage.

Whenever it is practical, ammeters and voltmeters have their shunts or resistances built **inside** the meter. However, when building a meter with several different scales marked on its face, or when building a meter to measure high amperage or fairly high voltage, there may not be sufficient room inside the meter to hold the shunts or resistances. In this case external shunts or external resistances are used. For that reason, before using a meter you should always know if it is supposed to be used with external shunts or resistances. If you use it without its proper shunt or resistance—you'll be using it for the last time *

**For example see page 83*

10,000 miles. What we really wanted to know was—what B.F. was responsible for the high convoy speed?

But this happens every day. Not just to new vehicles but to vehicles that have just had new or reconditioned engines installed.

If there's anything that really amuses a B.F., it's getting into a vehicle with a new engine and driving hell out of it. That's the way to test them—isn't it? Then of course there's the careful B.F. who observes the rules in this way. He's heard that a new engine shouldn't be driven over 25, so he slaps her into second or low gear and charges down the highway with the speedometer reading twenty-five and the engine speed doing the equivalent of 50 miles per hour.

This engine sabotage is done by two different kinds of B.F.s. The first is the kind who doesn't give a damn. The second type are the ones who don't know any better. We'll just leave the first ones to think it over while we slip the second type the facts on engine life.

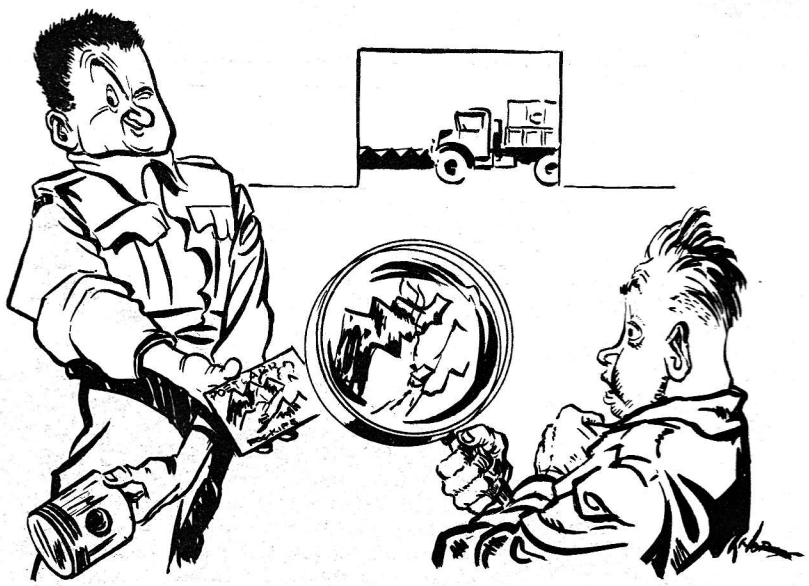
When an engine is new, or has been reconditioned, all the parts fit like a glove. There's very little clearance between moving parts for lubrication. On top of this—if you were to scan the surface of these parts through a strong enough magnifying glass you'd see hills and cavities that would remind you of the picture postcards of the Rockies. Rubbing them together, causes friction and nature takes it from there.

Heat is developed by the friction and the heat causes expansion—result—less room for lubrication. The faster the engine is operated the greater the friction and heat. First thing you know (if things haven't seized up solid in the meantime) the parts tear chunks out of each other in the form of scored pistons and bearings and your engine is more than half worn out before you go 300 miles.

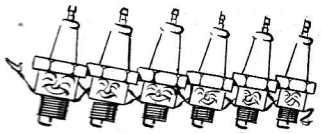
That's why it's sabotage to break in an engine at 40 or 50 miles per. If you break it in at lower speeds—the bumps on the surface of the parts will wear off slowly. The temperature won't go too high and there'll be plenty of lubrication to prevent excessive wear.

Mix plenty of discretion with that first few hundred miles—it isn't rationed and it's great stuff for motors—especially new ones.

x y z



". . . . you'd see hills and cavities . . . ."



SIX LITTLE PLUGS

Six good spark plugs
Very much alive,
Someone used a pipe wrench
And then there were five.

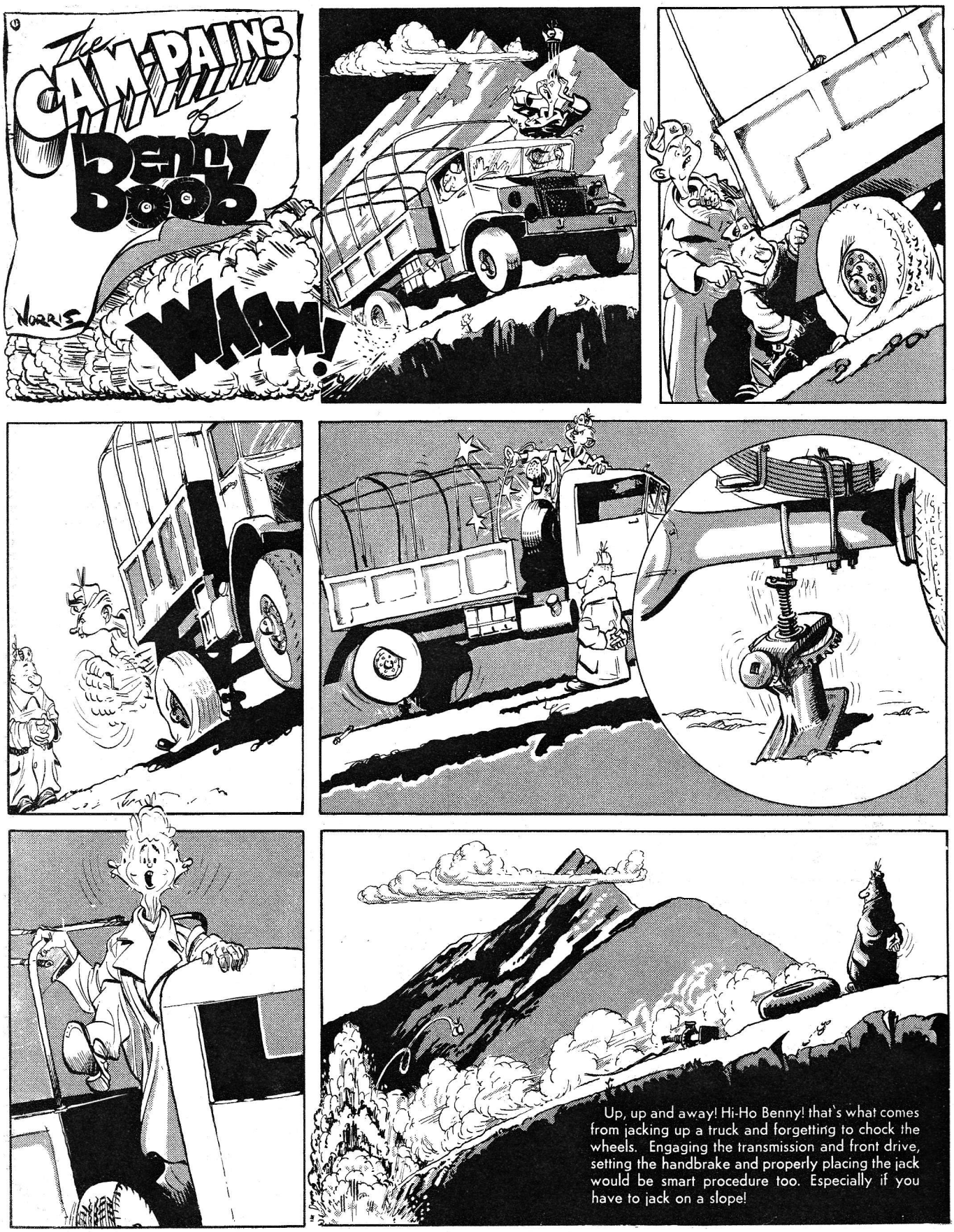
Five good spark plugs
Ready to go to war,
One rolled off the fender
And then there were four.

Four good spark plugs
Adjusted to a tee,
One was overtightened
And then there were three.

Three good spark plugs
All had work to do,
One split from detonation
And then there were two.

Two good spark plugs
Helping fight the Hun,
One was adjusted wrong
And then there was one,

One good spark plug
Soon went on the bum
It wasn't tightened up
And then there were none.


The CAM-PAINS of BENNY BOOB
NORRIS
WHAM!
Up, up and away! Hi-Ho Benny! that's what comes from jacking up a truck and forgetting to chock the wheels. Engaging the transmission and front drive, setting the handbrake and properly placing the jack would be smart procedure too. Especially if you have to jack on a slope!

PSSST... that's a Carter!

With, or without a tag, you shouldn't have trouble indentifying G.M. or Chev. Carburetors.

HAND a man a Ford or Jeep carburetor and if he's even slightly the carburetor type, he'll have it fixed up in jig time. Give the same man a Carter carburetor off a Chev or G.M. and you may have to duck into the nearest grease pit to get out of the way of flying parts.

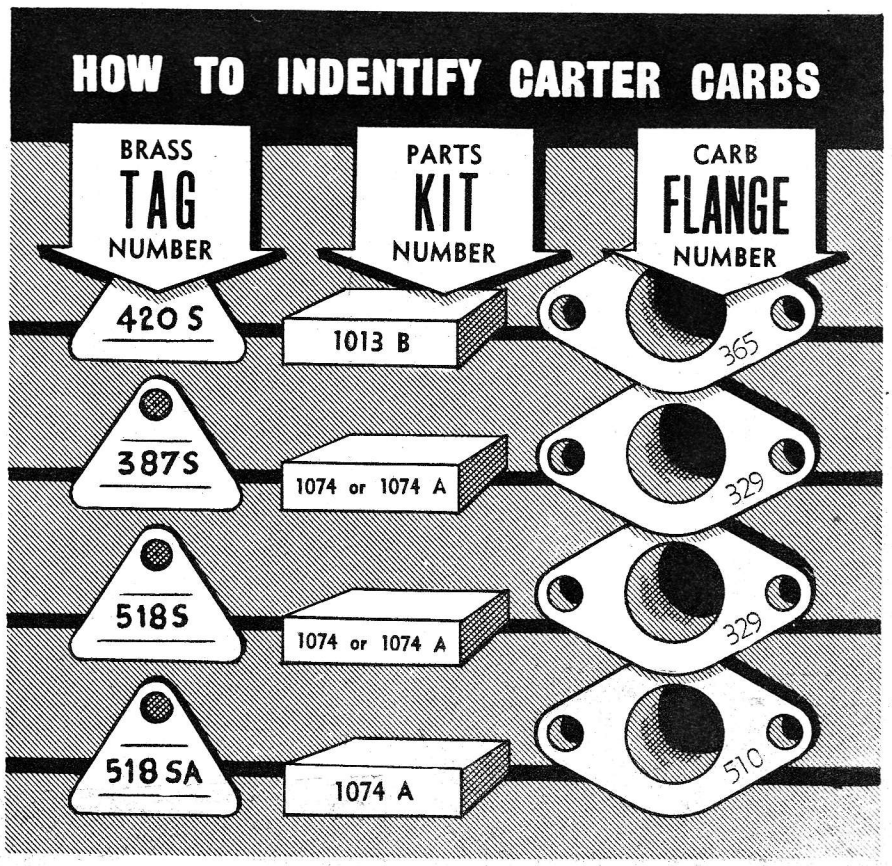
Why so? Well, that's just what we'd like to know.

Perhaps it's because these Carter carburetors on Chevvys and G.M.s look the same, but are not. If the parts for them are indented for by the byguess and bygodfrey method, chances are you'll wind up with the wrong parts kit. This is a nice carefree system and the law of averages, in time, will turn up the pieces that belong. It's also expensive, time wasting and downright foolish. You don't have to be a crystal gazer to pick the correct parts kit the first time—all you have to know is how to identify the carburetor—with or without the triangular brass identification tag.

All in all there are four Carter carburetors you may run into on your G.M.s and Chevvys. They are all Carter W-I's and any one might fox you up. They weren't made different just to keep you awake nights—there's a much better reason than that. The real reason is because staff cars and station wagons haven't got the same fuel appetite as your heavier trucks. Switching carburetors from a light vehicle to a heavier vehicle then, might lead you smack into the middle of a performance problem. Draw up a desk and we'll explain how these four carburetors differ and how you can identify them.

420-S

The one known as 420-S by its brass tag takes kit No. 1013B. It also has number **365** stamped on its bottom flange face. So if the brass tag is missing you aren't left without a paddle. This carburetor is the one used on staff cars and station wagons, and due to its smaller jets, won't give good performance on trucks. The float setting on the 420-S is ½" while the float setting on the other three carburetors is ⅜".



D.N.D. and Commercial type vehicles (except the 6 x 6) take a slightly different Carter. There are three of them, all having different jet sizes than the 420-S, and different numbers on their brass tags.

387-S

This is the first. It differs from the 420-S in several ways because it was designed to give more power for cross country operation. It can use kit No. 1074 or the later one, No. 1074-A. The number stamped on it's flange is **329**. You'll find the choke looks a little different. Instead of a one piece butterfly valve on the choke shaft, the butterfly comes in two halves. When installing the choke on this job, make sure the letter C, stamped on both halves of the butterfly, is facing up and to the same side of the carburetor as the choke operating lever. Trying to install a 420-S parts kit in 387-S or vice versa is like trying to wear someone else's teeth—you'll put the bite on the engine performance right away.

518-S

This little carb is almost a twin sister to the 387-S. Its flange number is also **329**. The only real difference is the throttle shaft. You'll find the 518-S has an ear sticking out on the end of the throttle arm, otherwise the carburetor is the same. It uses the same size jets—same kit of parts—same 3/8" float level. In fact—in a pinch you can even interchange the throttles.

518-SA

Time marches on and with it marched a new edition of Carter with number **510** stamped on its flange. Like all new babies you'll find there's been some changes made. The diameters of the steps on the metering rod are about 5/1000 smaller than they were on the 518-S carburetor. This provides a slightly richer mixture. The lower casting has also been redesigned. The idle port is in a different position making for better idling, and the vacuum spark control port has been altered to give a more positive advance of the distributor. The vacuum channel now leads directly to the throat of the carburetor, doing away with the holes in the throttle shaft. These changes improve all around performance and get away from those flat spots sometimes found with the 518-S and 387-S carburetors.

If you run into a 518-S or 387-S that gives trouble you can improve the situation by installing the 518-SA type metering rod—(part number 75-571) but don't ever try to install the 518-SA lower body on the earlier type carburetor.

When a new kit of parts is required for the 518-SA use kit number 1074-A. This parts kit was brought out especially for this carburetor but it can also be used in the 387-S and 518-S jobs to cure performance troubles.

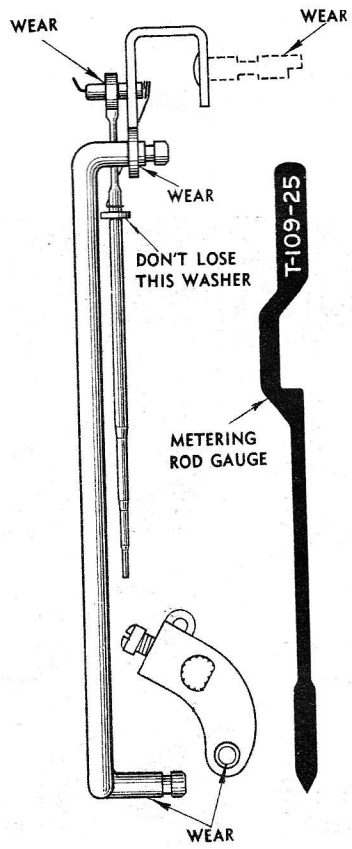


Fig. 2. Here's where you may find wear. Sloppiness at these points is bad for good carburetion. The metering rod gauge you'll use for Chev and G.M.C. "carbies" is also shown.

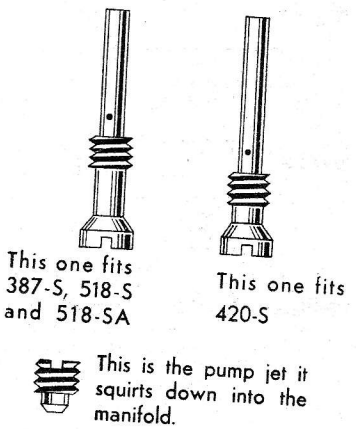


Fig. 3. A little difference makes a lot of difference to carburetor parts. Just like using salt instead of sugar when mixing hot ru-er-cake.

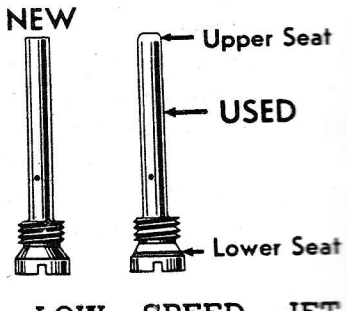
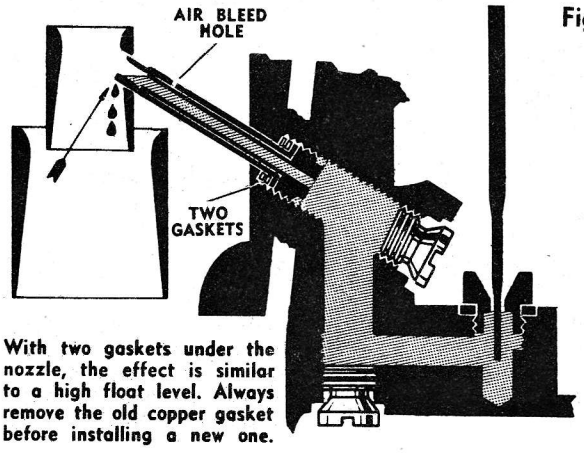
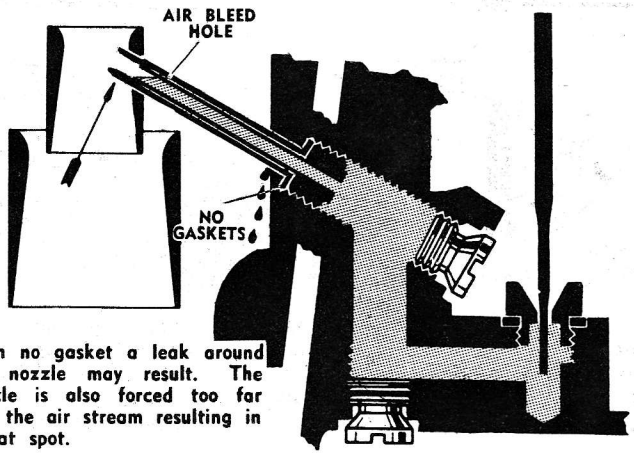


Fig. 4. A tight seat—that's what's necessary for good idling.



With two gaskets under the nozzle, the effect is similar to a high float level. Always remove the old copper gasket before installing a new one.

Fig. 5



With no gasket a leak around the nozzle may result. The nozzle is also forced too far into the air stream resulting in a flat spot.

A WORD TO THE WISE

Like all other carburetors—these W-1 Carters have certain peculiarities and it pays to know about them before you start messing around. We aren't going to keep you late for your Lilly-Whiters Club meeting with a play-by-play description of how to overhaul them—but we will toss you a few fast hints.

For example—the two important adjustments are the float level and the metering rod setting. Faulty adjustment of either one can cause poor engine performance and low gasoline mileage. The metering rod adjustment requires a special gauge. There's only one metering rod gauge for all these models (including the 420-S) and the gauge number is T-109-25. Use it properly and you can't go wrong—but you **must** use it, even when you install all new parts.

The metering rod controls the amount of gasoline going into the engine at all speeds above idle. That's why it needs accurate adjustment. That's also why you'll be very fussy about wear in the linkage that controls the movement of the metering rod. This entire linkage is shown in the illustration which points to the spots where wear is liable to be found. The remedy is new parts.

POOR IDLING

Many a time a carb job has to be done over again because of poor idling. See the two idling jets in the (Fig. 3). Well one of them fits the 420-S, the other one fits the 387-S, 518-S and 518-SA. Side by side you can see the difference and probably realize that they aren't interchangeable. But let somebody switch them on you when your back is turned and you'll need to be on your toes like a bubble dancer to notice the difference.

Here's another snag that might trip you up. In the same picture as the *idle jet* they sometimes find their way into the wrong part of the carburetor. Take a good look at the picture. The little accelerating jet points *down* into the air horn when it's installed in the right place. The idle jet—(the long one) screws in place in the **bottom** of the carburetor like the two check valves and points *up*. Mixing them up is just as crazy as if we had set this paragraph upside down!

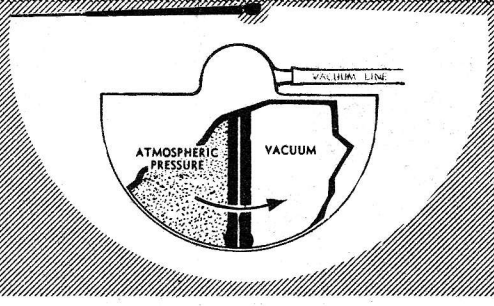
And that's not all that can cause poor idling. When the idling jet is in place it has to seat perfectly at two places. The conical shaped copper gasket acts as a seal at one end of the jet while the tip of the jet fits into a tapered seat in the casting. Once the jet is installed in the casting its tip becomes tapered. Before it's installed, the tip is straight. That means you can't take an idling jet out of one carburetor and expect the tip to seat tightly in another carburetor. Even reinstalling the old jet in the same carburetor after a cleaning job might result in poor idling. A new jet is the best insurance but in a pinch you can "bell out" the tip of the old jet with a sharp pointed tool. This operation requires a delicate touch.

After all this you can **still** have poor idling if you don't clean the carbon and dirt out of the carburetor throat around the throttle—giving special attention to the small idle port in the casting. When the throttle is closed the letter 'C' stamped on the butterfly should be staring you in the face and should be on the same side of the casting as the idle port. If the butterfly is downside-up your engine will be strictly a high speed job—no idling.

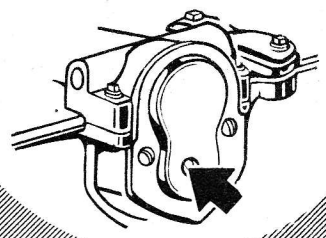
ACCELERATING PUMP

Stuffing the accelerating pump leather into the cylinder with screw-

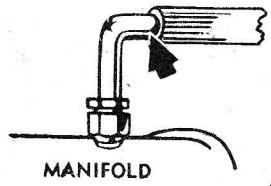
(Continued on page 99)



The trick valve opens one side to atmosperic pressure and when the paddle goes as far as it can in one direction the valve flips over and opens the opposite side to the air pressure.



This is the valve cover plate showing the hole that the wiper depends on for respiration. When your wiper slows to a walk because it can't breath—poke a pin clear through this hole.



This is where your wiper efficiency starts. Air leaks at the intake end of the wiper hose are common due to heat and oil affecting the rubber. Keep this connection clean and tight.

A little understanding of windshield wipers might easily keep you out of a hole—six feet deep.

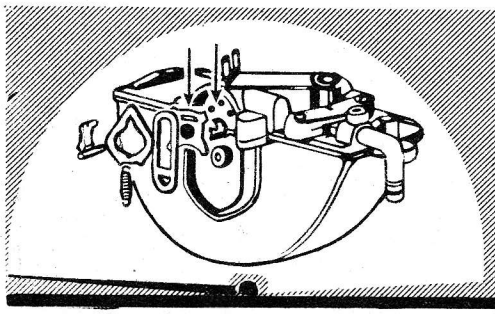
MAYBE the reason army trucks aren't equipped with instruments for blind driving is an oversight. That thought occured to us the other day when we saw a 30 cwt bowling down the road leaving a trail of assorted poles and pedestrians in its wake. Seeing that the windshield of this vehicle was about as clear as a bowl of grandma's pea soup we thought a helping of simple windshield wiper maintenance might be a good spring tonic for drivers.

Not that the driver is expected to yank the wiper off and give it an overhaul on the side of the road but —fifty per cent of the time wipers only need a little thisa and thata, so here's the data to keep them wiping.

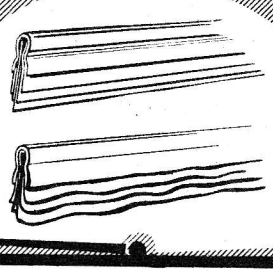
For example—did you know your wiper has to breath? It does, be cause its motor is operated by the pressure of the atmosphere upon a paddle enclosed in a housing. By a trick valve arrangement, the vacuum created in the engine's intake manifold is utilized to alternately exhaust the air from first one side of the paddle then the other. Atmospheric pressure on the opposite side is what pushes the paddle over. The motion of the paddle operates the valve so that the vacuum occurs first on one side then the other—giving a motion like the spectators heads in a snappy tennis match.

Right in back of the motor is the valve cover. Some covers are the push on type, in which case they are a loose enough fit for the motor to inhale and exhale around its edges. On other wipers the valve cover is held on by screws and is sealed around its edges by a gasket. This type of cover has a breather hole—small but necessary.

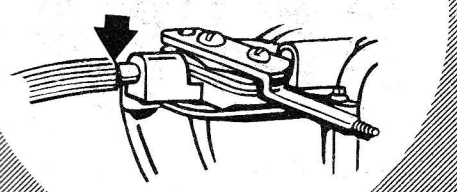
If this little hole gets clogged with bits of dirt, lint or other small objects the wiper will slow down for lack of breath and in time will quit entirely. It takes about as long to cure this trouble as it takes to pronounce windshield wiper back-



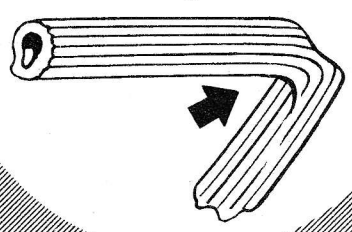
These are the spots that are apt to get all mucked up with dirt and lint. Careful cleaning will do the trick—especially the valve ports.



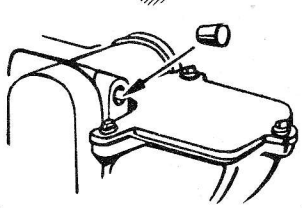
Nice soft pliable rubber with straight edges is the ticket. A wavy blade is about as good as a comb for whisking the rain off the glass.



Leaks are often found at the wiper end of the hose. You know what it's like dragging on a cigarette if there's a hole in the paper. You'll have similar results if the wiper hose leaks.



Sharp bends, kinks or collapsed hose are just as bad for wiper operation as a kinked straw is when you are inhaling a lemon-coke. Keep your eye peeled for old and rotted hose too.



Here's that little top cover plug that will let your wiper down anyplace, anytime, if it becomes loose. In a pinch, a wooden plug or your chewing gum will get you by for a little while.

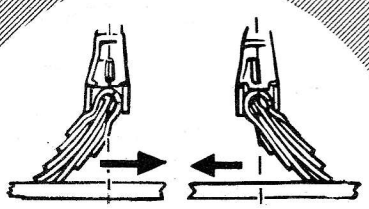
wards, (which incidently is repiw dleihsdniw). All you do is find the little breather hole and a pin (or some other weapon of the same nature) and poke it through the hole. No need to tell you how much easier it is to do this than to drive in a blind rage with the wind, rain and windshield wiper in your hair.

Another common wiper trouble is often found in the vacuum line between the intake manifold and the wiper motor. Leaks or restrictions in this hose will slow down or stop the wiper. If it's leaking, you may be able to detect where the air is being sucked in, with your good ear. An easy check to see if there's vacuum at the wiper end of the hose is to disconnect it at that point. Place your finger over the open end of the hose (with the engine idling) and you should feel quite a strong pull on your finger. You'll also notice a change in engine speed at the same time due to the different amount of air going into the intake manifold. If you don't feel a fairly strong pull on your finger, better check for leaks or collapsed or kinked hose.

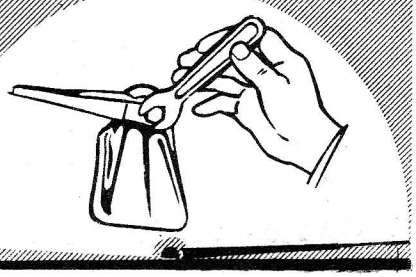
No need to tell you how difficult it is to get at most wipers—you probably know already. This is a very good reason why windshield wiper troubles should be noticed and corrected during the C.P.M.S. 1. Few wiper troubles happen suddenly. Instead, their efficiency usually decreases gradually, giving the driver ample warning. One trouble that can and does happen on the road however, is the top cover plug becoming loose. If this happens it's doubtful if you'll be able to tap it tightly into place without removing the wiper from the vehicle. In some cases you may be able to plug the hole with your chewing gum. You've probably been chewing it too long anyway. If you have no gum handy, whittle a wooden plug out of whatever is available. Either of these cures will get you by until you can get back to the shop and have the proper plug installed.

Another common wiper disease is valve mechanism. This is not very simple to correct either, because it means giving the valve a good cleaning. It means removing the valve cover and carefully removing the fibre yoke and other valve parts. All the parts should then be washed in

Here's what we mean by that flip-flop paint brush action. If it doesn't flip it's a flop. So make sure it has correct arm pressure.



Loose nuts here give more trouble than a loose knob on the bathroom door. The result is lost motion, wasted effort and extra wear on the linkage.



cleaning fluid. If the surface of the casting on which the sliding valve operates is gummy or has particles of dust and grit on it you're bound to have non wiper action so clean it carefully. When assembling the valve mechanism, a drop of **very light** oil won't do any harm on the sliding valve but if you haven't any light oil—leave it dry.

Some wipers wag like mad but still don't do any wiping. A wiper in this condition does you about as much good as a bar of soap and no water. To properly derain the windshield the wiper blade must be flexible. When the rubber in the blade becomes hard and dry it can't do its work. Old blades should be noticed during your C.P.M.S. inspection and a new blade installed as soon as possible—regardless of the colour of the sky or the direction of the wind.

Besides being soft and pliable the blade must be straight on its wiping edge—not wavy or distorted. If it is wavy or distorted somebody has been oiling your windshield. You know what oil does to rubber so never handle wiper blades with greasy hands or clean the windshield with an oily or greasy rag.

Even if the blade is new some wipers won't wipe on account of poor arm adjustment. The wiper arm maintains the proper pressure and position of the blade. If it's doing its job, the wiping edge of the blade will flip-flop from side to side with the motion of the wiper. Like a brush when you're white washing the barn. New arms automatically give this correct pressure but if a new arm isn't available, old arms can be made to work by careful bending.

Most wiper arms on your army vehicles are the lock on type. These lock nuts must be tightened securely to prevent lost motion between the shaft and arm.

There's an easy method of testing wipers for speed if you want to see whether they're operating up to snuff or not. With the engine idling, turn the wiper motor on to full speed, then clock it with your Pocket-Ben. A wiper in good working order should make approximately 100 double swipes per minute on dry glass. Cleaning the grit and dust off the glass before making this test is not a bad idea.

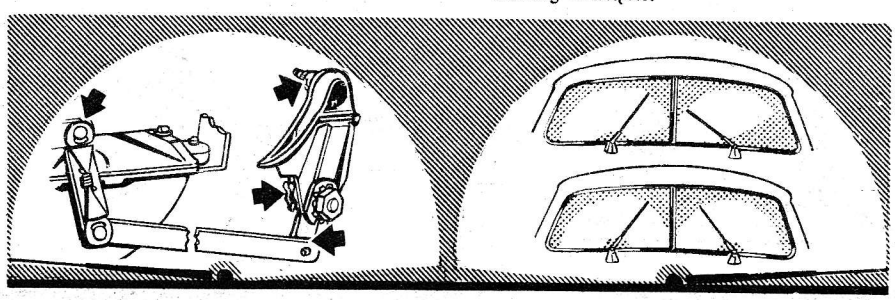
Another cause of poor wiper operation is binding linkage. By disconnecting the linkage from the wiper and operating it by hand you can tell if something is dragging. Make sure the linkage isn't rubbing against parts of the vehicle. All moving parts should be lubricated with light penetrating oil but keep the oil away from the rubber on the blade.

So you see—there's no reason not to **see**—and go wall-eyed from dim vision—not if you know how and what to look for where your wiper is concerned.

x y z

Here are the main points on the linkage to lubricate. Always take off the arm before oiling the linkage so you can get the oil in the right places without getting oil on the blade.

Lop-sided cleaning not only tends to drive one mad but it makes for unsafe driving. Correction can be made by re-positioning the wiper arm on the shaft or shifting the motor on its attaching brackets.



TOO

SOMEWHERE east of Suez, a medium tank loses its firepower because the nuts and bolts holding the gun mounts are loose.

Somewhere west of Berlin, a 60 cwt 6 x 4 stalls along the Red-Ball Express Highway because someone overtightened the fuel pump bowl cover.

These kind of happenings are damn bad business. Especially as they need not happen at all if this question of 'tight' has been settled right before the wrenchwrassler responsible went to work on them.

Lots of words have been written and said on this 'tight' business. "Check for looseness'—"Check for security of hold down bolts" "Inspect for loose or missing nuts, bolts" "Tighten cap screws". You've seen these phrases so often in C.P.M.S's, Bulletins and Manuals, that it's pretty near second nature for a good driver or mechanic to automatically go over everything in the image of a bolt or nut with his trusty wrench.

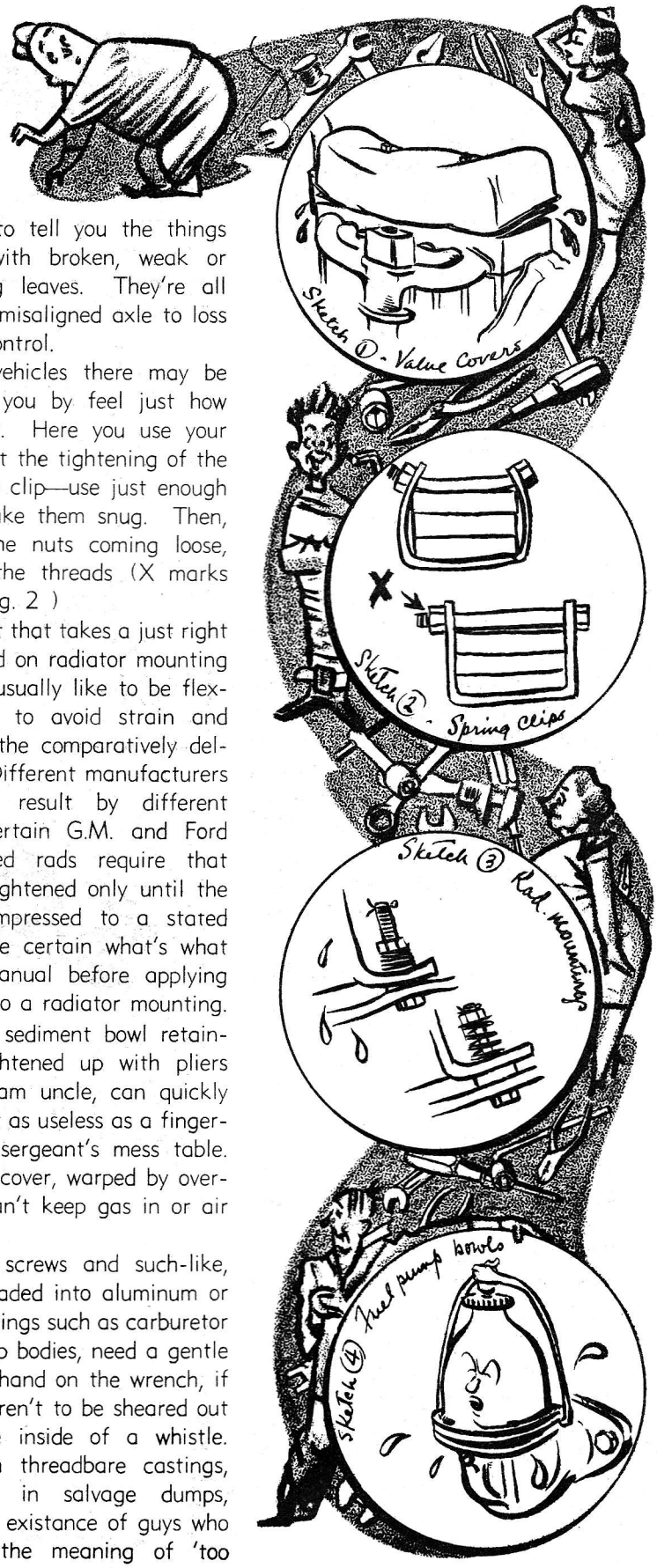
It's the careless Joes that get caught with their pans down due to nuts, bolts and fittings on the loose, and we're not so concerned with them right now, for they're easy to spot and catch up with.

But what about the conscientious character? He's heard this same sermon on the importance of keeping things snug and tight—and he applies his beliefs (and his manly strength) with impartial generosity and doglike devotion in all directions. He's imbued with the philosophy that if he gives everything that a wrench or a pair of pliers can grip, plenty of THAT, no troubles will ever befall him far from home.

But they do.

Troubles overtake him because,

TIGHT



tucked away here and there throughout the assemblies and accessories on his vehicle, are places where a strong, but ignorant arm on a wrench wreaks havoc. Places where 'Too tight' is as lethal as 'Too loose'.

Start with spark plugs. You wouldn't think that anything could be simpler than putting a spark plug into a cylinderhead. Yet, put too much beef behind the wrench and the spark gap, which you had just carefully adjusted to .025", jumps to .35". Hard starting and poor engine performance become a direct result of 'too tight'.

This is a spot where just the right tightness is all important. Giving the plug a one-half turn after it has seated itself against the gasket is the recommended bill of fare.

Take valve covers. You've seen them lots of times with oil leaking out from under the edges. You've seen the mechanic, too, who cusses a blue network because he has just finished putting a new gasket behind that cover and still it leaks. So he puts another turn on the cover's hold-down nut. And it leaks more than ever. He's got 'too tight' trouble too. On some vehicles, if the hold-down nuts are over tightened the cover gets distorted—leaving room for the oil to run out like it was free. '*Feel*' is the secret here. Tighten the nut down with your fingers—then easy with the wrench till you can *feel* the gasket being crushed—hold it!—it's tight.

Then there's the spring rebound clips. Reports still come in telling of the failure of these clips caused from over-tightening. Sometimes the threads shear. Often the clip itself fractures, allowing the spring leaves to shift or even break. Nobody should have to tell you the things that come with broken, weak or shifted spring leaves. They're all bad—from a misaligned axle to loss of steering control.

On some vehicles there may be little to tell you by feel just how tight is right. Here you use your eye. Don't let the tightening of the bolt 'bow' the clip—use just enough muscle to make them snug. Then, to prevent the nuts coming loose, prick-punch the threads (X marks the spot in Fig. 2)

Another nut that takes a just right touch is found on radiator mounting bolts. Rads usually like to be flexibly mounted to avoid strain and breakage of the comparatively delicate core. Different manufacturers achieve this result by different methods. Certain G.M. and Ford spring-mounted rads require that the nut be tightened only until the spring is compressed to a stated length. Make certain what's what from your manual before applying your wrench to a radiator mounting.

Fuel pump sediment bowl retaining nuts, tightened up with pliers till they scream uncle, can quickly make the unit as useless as a fingerbowl on the sergeant's mess table. A filter bowl cover, warped by overtightening, can't keep gas in or air out.

Bolts, cap screws and such-like, that are threaded into aluminum or soft alloy castings such as carburetor and fuel pump bodies, need a gentle and knowing hand on the wrench, if the threads aren't to be sheared out clean as the inside of a whistle. Piles of such threadbare castings, accumulating in salvage dumps, testify to the existance of guys who don't know the meaning of 'too

tight'.

Long ago, engineers calculated the cold figures and facts on how tight is right for various metals and bolt sizes. They'll tell you that when a heat-treated steel bolt is tightened properly—when it's tight enough to hold the maximum load it was designed to hold—it will be stretched. Stretched enough so that if you measured it with a micrometer it would be .003" longer for every inch of bolt length, regardless of the diameter of the bolt. They also know that this bolt has an elastic quality that will allow it to stretch this far and then, when the pressure is taken off, return to its original length. Like the elastic band that used to be in pyjama pants (when you used to wear pyjamas).

But these same pyjama pants, if a 300 pounder gets into them my mistake, would never be the same again. Some of the excessive stretch becomes permanent and they measure larger when unstretched. So with the bolt. Tighten it so that the stretch goes very much beyond .003" per inch of bolt length and a small amount of this stretch becomes permanent — and the bolt becomes weaker.

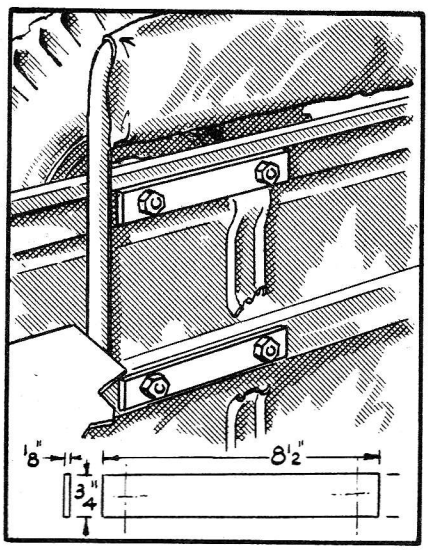
This is the sort of thing that causes a manufacturer to list torque specifications, and in special cases, exact stretch measurements for various bolts doing important jobs in his equipment.

But all that the engineers, designers and metallurgists have done can be written off the books if **you** —the guy that has the final say on those bolts—hasn't got that certain sensitive something in your good right arm. A torque wrench and torque specs are not always on hand —or called for. Some day, when you're posed with an important job of tightening to do, it's going to be mighty handy to know that you've got the answer in the palm of your hand.

x y z

Reinforcement question

Here's our answer to one of the problems—on the Jeep spare tire bracket



THE spare wheel carried on the back of jeeps is cutting loose. Rough, rutted and washboard roads are doing it with an overdose of vibration—and the weight of the spare wheel is pulling the bracket bolts out by the roots.

To stop these goings on—here's all you do. Weld two pieces of steel (¾" x 8½" x ⅛") onto the inside of the rear panel for the bracket bolt nuts to bear against—as shown in the picture.

We hear that late production jobs have a redesigned bracket that supports the weight of the wheel in a cradle. You most likely have the Plain-Jane bracket — so if you're operating on rough surfaces, this quick, simple, cure is the answer.

S.O.B.*

Form 6102B

CANADIAN NATIONAL TELEGRAPHS

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CANADIAN NATIONAL TELEGRAPH AND CABLE

CLASS OF SERVICE DESIRED
FULL-RATE MESSAGE
DAY LETTER X
NIGHT MESSAGE
NIGHT LETTER

PATRONS SHOULD MARK AN X OPPOSITE THE CLASS OF SERVICE DESIRED. OTHERWISE THE MESSAGE WILL BE TRANSMITTED AS A FULL-RATE TELEGRAM

RECEIVER'S NO.	TIME FILED	CHECK
CAM VOL 2 NO. 5	FEBRUARY	CHECK - CHECK - CHECK BRAKE FLUID CANS

Send the following message, subject to the terms on back hereof, which are hereby agreed to
Veuillez expedier la dépêche suivante aux conditions mentionnées au verso auxquelles je consens par les présentes

RELAY MESSAGE FROM FACTORY TO FIELD

FLASH - WARNINGS ARE STILL COMING IN REGARDING ISO BRAKE FLUID IN PINT QUART AND GALLON CANS STOP WHEN GLASS JARS ARE NOT AVAILABLE THIS FLUID IS BEING SHIPPED IN CANS WHICH ARE ENAMELED ON INSIDE STOP ACTION OF THE FLUID WILL IN TIME CAUSE ENAMEL TO SHRIVEL UP AND FLAKE OFF STOP PARTICLES OF PAINT DO NOT HURT THE FLUID BUT IF ALLOWED TO ENTER HYDRAULIC BRAKE SYSTEMS WILL RESULT IN NO BRAKES DRAGGING BRAKES OR STICKY BRAKE CYLINDER PISTONS STOP DUE TO SCARCITY OF CERTAIN CHEMICALS DO NOT THROW OUT BRAKE FLUID STOP TO AVOID CALAMITY ISO FLUID IN PINT QUART AND GALLON CANS MUST BE FILTERED THROUGH SEVERAL LAYERS OF GAUZE BEFORE USING IT IN HYDRAULIC BRAKE SYSTEMS OR YOUR VEHICLE WONT STOP

*SAVE OUR BRAKES

For the love of CONTACTS

....know how to dress 'em

WE agree, filing distributor contacts can be a bad habit if it's overdone. On the other hand, many a contact can be made as good as new if it's cleaned properly. The secret lies in when and how to file or dress them.

Ever since contacts were first used to make and break the circuit in ignition systems, automotive mechanics have considered contact files an essential part of their equipment. If an engine didn't run as it should—a lick and a promise with the file often did the trick—and still does, even on modern high speed engines. The catch is, it doesn't stay that way. Knocking the dirt and oxidation off the contacts may eliminate the trouble temporarily but from an engineering standpoint this method often does more harm than good.

Distributor contacts smack together approximately 9000 times every single mile ticked off on an average six cylinder vehicle. That's one reason why the contacting surfaces are made of hard tungsten alloy. Being a hard material, it's difficult to file and end up with a job that looks like the right half of Fig. 1. The point to remember is this. Distributor Contacts last longer and give better ignition when they have a large contacting surface. That's why the name "distributor **points**" is misleading. So let's **not** call a contact a point, and get down to cases.

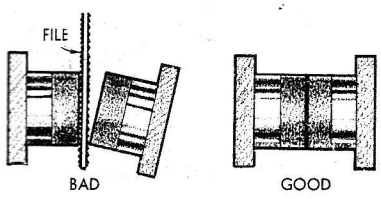


Fig. 1. If you don't want to end up with a poor job, take them out of the distributor—it pays in the long run.

Fig. 2. shows a condition of pitting that is a good example of when contacts should not be filed. The only electrical contact in this case would be on the tit. Filing off the tit would reduce the contacting surface to such an extent that you'd end up with poor ignition. The thing to do in this case is install new contacts.

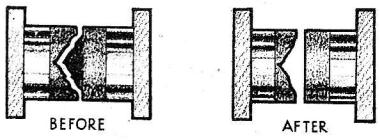


Fig. 2. Not much use filing these contacts is there?

Another case when contacts should not be filed is when they have that even frosty grey look. This is an indication that they are making good contact and their operation can't be improved by filing.

If however you run into a set of contacts that are only dirty, or oxidized, they can be made to last a long time if they are cleaned with a certain amount of care.

This can best be done with the contacts removed from the distributor, because running a file between them while they are still in the unit usually results in only filing about ¼ of their surface. (Fig. 1.)

Emery cloth is bad business because, nearly always, particles of the emery are left embedded in the tungsten. This causes excessive arcing when the contacts are in operation.

The best method is to use a very fine flat file. Remove as little material as possible because if you file past the tungsten you might as well throw the contact away. After you've barely uncovered a fresh surface, finish the job up with a hone or oil stone. Keep an eye peeled for parallel surfaces and try the contacts together, while they're out of the distributor, to see how they meet. A magnifying glass (if you can find one) will help you to see if you are getting a smooth, flat contacting surface.

There's a special contact hone called the "Flex-stone" on the scale of issue for workshops and unit garages. Its part number is S-GA-3 and can be procured through the District Ordnance Officer.

When the job is completed, all fingerprints and traces of oil or other foreign matter should be removed from the tungsten surface with carbon tet. If you haven't got any, use a **clean** dry lint-free rag. Then keep your fingers off it.

There's no need to mention that the **cause** of the trouble should be removed before putting the contacts to work again. If the contacts were blue—look for coil trouble or high voltage in the generator system. If the contacts were black, look for condenser trouble. That's the only way you'll keep the same distributor out of the shop for a reasonable length of time.

Dressing contacts is a small point but an important one.

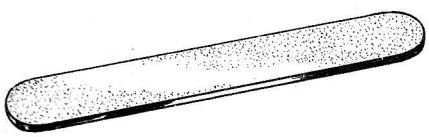
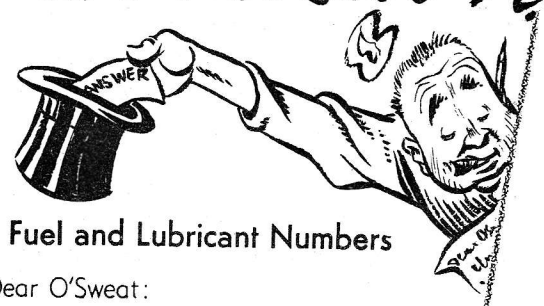
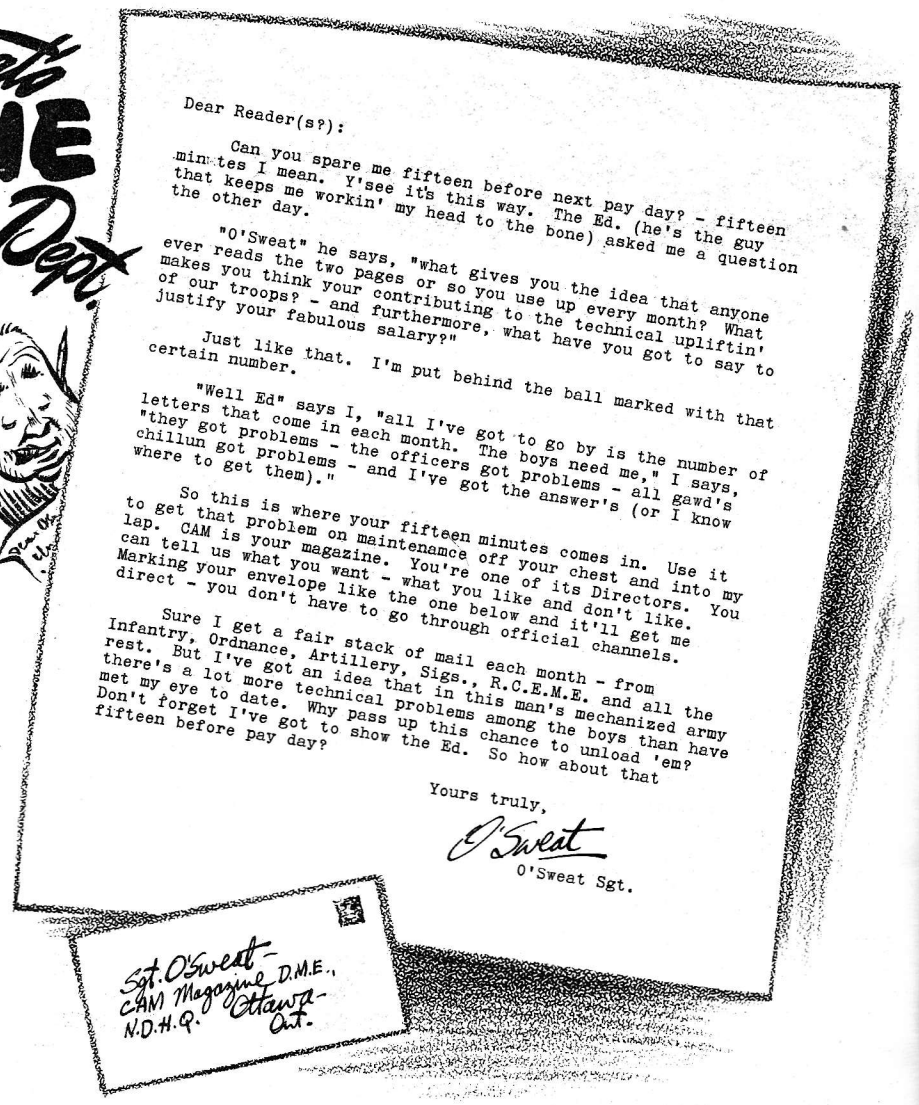


Fig. 3. If you haven't used one of these flex-stones on contacts you don't know what you've missed.

Sarge O'Sweat's HEADACHE and ASPIRIN Dept.





Dear Reader(s?):

Can you spare me fifteen before next pay day? - fifteen minutes I mean. Y'see it's this way. The Ed. (he's the guy that keeps me workin' my head to the bone) asked me a question the other day.

"O'Sweat" he says, "what gives you the idea that anyone ever reads the two pages or so you use up every month? What makes you think your contributing to the technical upliftin' of our troops? - and furthermore, what have you got to say to justify your fabulous salary?"

Just like that. I'm put behind the ball marked with that certain number.

"Well Ed" says I, "all I've got to go by is the number of letters that come in each month. The boys need me," I says, "they got problems - the officers got problems - all gawd's chillun got problems - and I've got the answer's (or I know where to get them)."

So this is where your fifteen minutes comes in. Use it to get that problem on maintenamce off your chest and into my lap. CAM is your magazine. You're one of its Directors. You can tell us what you want - what you like and don't like. Marking your envelope like the one below and it'll get me direct - you don't have to go through official channels.

Sure I get a fair stack of mail each month - from Infantry, Ordnance, Artillery, Sigs., R.C.E.M.E. and all the rest. But I've got an idea that in this man's mechanized army there's a lot more technical problems among the boys than have met my eye to date. Why pass up this chance to unload 'em? Don't forget I've got to show the Ed. So how about that fifteen before pay day?

Yours truly,

O'Sweat

O'Sweat Sgt.

Sgt. O'Sweat
CAM Magazine D.M.E.,
N.D.H.Q. Ottawa-
Ont.

Fuel and Lubricant Numbers

Dear O'Sweat:

Once upon a time I worked in a service station and was familiar with all kinds of oils and greases.

Now I'm in the army and find names, types and numbers all different to the ones used by the oil companies.

All I want to ask you is "why?".

Cfn. D.A.S.

Dear Cfn. D.A.S:

"Why" is a pretty big word at times and this is one of those times. You see, those lubricant numbers mean a lot to oil companies and certain branches of the army. It would be a long story and a dry one if it were told in full. So I'll try to brief it up and still tell you what I think you want to know.

Unlike a service station—the army has to carry a stock of lubricants to lubricate everything from small instruments to huge guns. On top of that, the army has to stock many different grades of cleaning fluids, hydraulic oils, fuel oils and gasoline. All these different products are purchased from many different oil companies. To prevent getting stuck with inferior grades, the army supplies the oil companies with certain specifications which the supplier has to stick to.

For example—suppose you worked for an oil company and the army gave you an order for 5,000 gallons of SAE-30 oil. Would you supply them with two-bit oil or fifty cent oil? That's right, you'd have to hold up the war while you got more information.

So when the army orders a certain quantity of oil or grease by a D.N.D. number, every oil company knows what is wanted. Actually the number is a code number. For instance take D.N.D. 604 grease. The (6) means it's a grease, the second figure (0) refers to the type of soap base and the third figure (4) tells its consistency.

With the exception of H.D. oil, the types of army lubricants are about the same as you handled when you were in the service station. If, however, you'd like to check up on all the numbers and types of fuels and lubricants, look up Routine Order No. 5069.

The average man in the workshop doesn't have to worry much about numbers, codes and what they mean —he's got enough troubles as it is. All you really have to do is go by the Army Lubrication Guides and you can't miss.

O'Sweat

Tire Markings

Dear Sarge:

This is a new low in ignorance but can you settle an argument by an article on what all those "figgers" and words such as "7.50 x 20-34 x 7"

"heavy duty", "Balloon" etc. etc. mean when stuck on the side of a tire. Seem to be several opinions as to just which way or ways the measurements are taken and exactly what different types of tires there are.

Sgt. G.B.

Dear Sgt. G.B:

I'm not normally a betting man but I'm willing to wager a pair of old sock tops there's lots of guys who don't know any more about tire markings than they do about laundry marks. But let me answer your question.

The sizes marked on tires are the approximate measurement of the tire when it's mounted on the rim, without load and inflated to its rated pressure.

There are three types of truck tires. The first is the high pressure type and uses size markings such as 34/7. This means that its outside diameter is approximately 34" and the outside width of the casing is 7". (Cross section width).

The second type is the balloon tire and these are marked a little differently. You'll find balloons marked like 7.50/20. The first figure, 7.50, is the outside width of the casing in inches. This measurement is taken at the widest point and is known as the sectional width. The other figure, 20, is the rim size and is the inside diameter of the tire in inches from bead to bead. When calling this tire by its size you would probably say seven fifty twenty, meaning 7½" by 20". (What you call it when you get a flat is beside the point).

Then there's the third type of tire that has dual or combination markings, such as 7.50/20 x 34/7. This baby is a later development and is actually a combination of the first two types I mentioned. It has an advantage over the others in that it permits heavier vehicle loads with comparatively low air pressures, giving more cushioning to the vehicle and its load and at the same time retaining the advantages of the high pressure tire. Because this tire can be used in place of either the balloon tire **or** high pressure tire it carries the markings of both.

Passenger car tires are made in "standard" and "heavy duty." "Standard" passenger car tires mean they are four-ply casings while "heavy duty" passenger car tires have six-ply casings. All truck tires are more or less heavy duty so when you see those words on the casing of a truck tire it doesn't mean much of anything.

You'll also see a small round coloured dot, on all tires except the very large truck jobs. This dot is near the bead and indicates the correct spot to place the valve stem for proper balancing.

When you see the word "Rayon" moulded into the sidewall it's just tipping you off on the kind of underwear it's wearing, and means the tire plys are constructed of rayon cord fabric.

Synthetic tires can be identified by the letter "S" and a number, usually inside a red circle (or rectangle). The number refers to a code which gives the proportions of synthetic and natural rubber used in the tire's construction.

Another marking you might see on the tire sidewall is MBL or BL. This means that the tires have controlled bead dimensions for use with metal beadlocks.

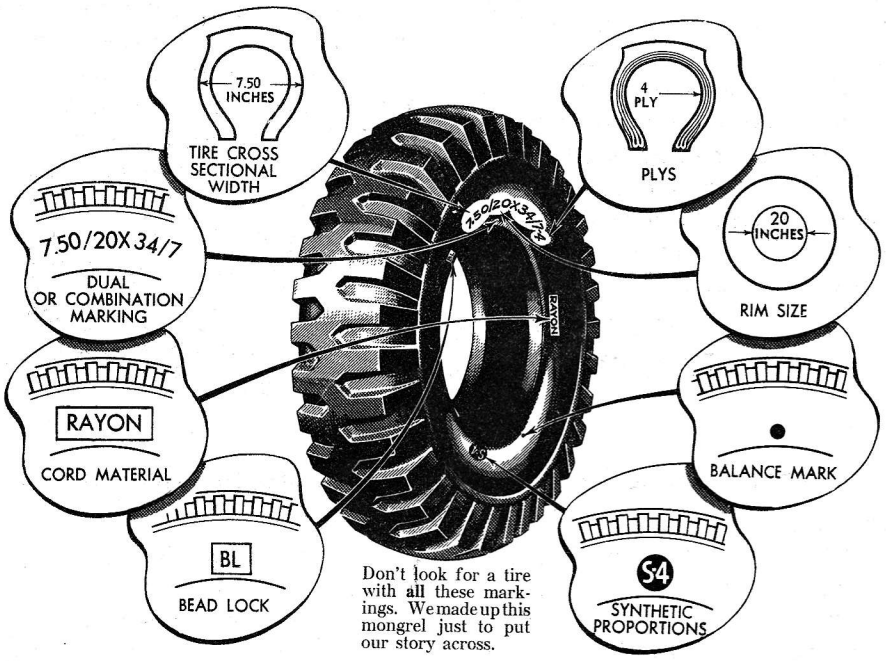
If you see the letter C.C. moulded in the sidewalls they stand for cross country and mean that the tread is specially designed for maximum traction in heavy going. Tires designed primarily for highway driving have not these identification marks but you can tell them by the conventional tread design that they wear.

Then of course, all tires carry an identifying serial number but that needs no explanation.

I'll finish up by mentioning the inflation pressure that is marked on some tires. This number is put on by the manufacturer and may not be correct for army use. To be on the safe side, follow the army specifications for inflation pressures.

In other words Sarge, with the exception of the last item, those hieroglyphics on the sidewall tell you everything but when the next flat is due.

O'Sweat



Don't look for a tire with **all** these markings. We made up this mongrel just to put our story across.

Tire Valve Leaks

Dear Sgt. O'Sweat:

We've been running into a mess of grief with tires becoming soft lately and so are appealing to you for help.

At first we thought it must be slow leaks in synthetic tubes but it wasn't long before we found out the leaks were all in the valve cores. Installing new valve cores corrected the trouble.

Can you explain why so many valve cores are going bad all of a sudden?

S/Sgt. B.P.

Dear S/Sgt. B.P.:

I wonder if you've tried tightening the valve cores to stop them from leaking all over the place?

You see, cold weather does things to metal, water, ears and lots of other things including rubber. It tends to make them brittle. It also causes most materials to contract. Therefore, seeing as how your valve core trouble developed during the frosty season, I'd say your slow leaks are caused by the rubber hardening and the metal in the valve core contracting. The valve can't seal as well on the hardened rubber seat—and the contracted metal core parts become loose fits. Result: whiffs of air sneak by. All they require is a little more tightening. When you installed new cores you unconsciously did this and corrected the trouble.

So before you run out of valve cores or decide to trade your trucks in for tracked vehicles, try tightening the valve cores.

O'Sweat

Ford Front Springs

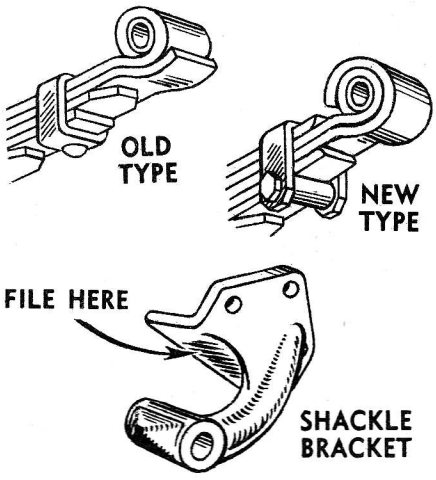
Dear O'Sweat:

Did you ever try to install one of the new type front springs in a Ford 15 cwt? I mean the one that is mentioned in the Army Service Information Bulletin H-4.

These springs won't fit unless part of number 2 leaf is partly ground off where it wraps around the spring eye.

Maybe I'm wrong but to help me settle a peaceful little argument with a certain sergeant will you tell me if this is the proper way to make these springs fit?

Cpl. G.B.S.



Dear Cpl. G.B.S.

I don't know who's side I'm on in your little argument but the answer is a loud NO. The wrap around part of number 2 spring should not be whittled down to size.

If you run into jobs where there is not enough clearance for the new type spring—file the inside of the front spring rear shackle brackets to fit (I say brackets because you always install the new type springs in pairs if you're changing over from the old type).

This should solve your problem without weakening the new springs.

O'Sweat

Motorcycle Batteries

Dear O'Sweat:

Here's something I've been going to ask you for a long time. It doesn't require an answer—it just requires action.

Don't you think somebody should remind motorcycle drivers to check the water in their m/c batteries?

Corp. S.T.

Dear Cpl. S.T:

Motorcycle drivers shouldn't have to be reminded about this. But I can take a hint, I'll tell 'em right here and now.

Motorcycle batteries need water just as often as any other battery does—don't neglect 'em because batteries of all kinds are hard to get.

Checking the battery is one of your weekly tasks according to your C.P.MS. form and checking in this case means adding water if it needs water. Use clean water (any water fit for drinking) and add **only enough** to bring the level 3/8" above the plates and separators. And another thing—this means 3/8" above the plates when the m/c is standing **upright**—not leaning on an angle.

O.K. Corp, I dood it.

O'Sweat

Ford Brakes

Dear O'Sweat:

About those awkward brakes on page 58 of December CAM. I've had the same trouble many times and it's always been the same thing—glazed linings. You can renew the whole works on a bus if you like, but if the linings aren't roughed up or renewed it's a waste of energy and material. Obviously this trouble is more prevalant on old vehicles. Hope this will help.

Capt. H.R.B
(Ex. Sgt.)

Dear Capt:

Thanks for the idea. Glazed linings is a natural when it comes to poor braking. If Sgt. R.E.S. didn't check this point before he wrote to me back in December, I hope he will now.

O'Sweat

CARBURETOR *(cont'd from page 89)*

drivers, ice picks or wrecking bars can result in more flat spots than there are on O'Sweat's head. The proper tool for loading this cylinder is in your carburetor tool kit. However, if you haven't got one, the loading tool is merely a bushing the same diameter as the pump cylinder so why not make one?

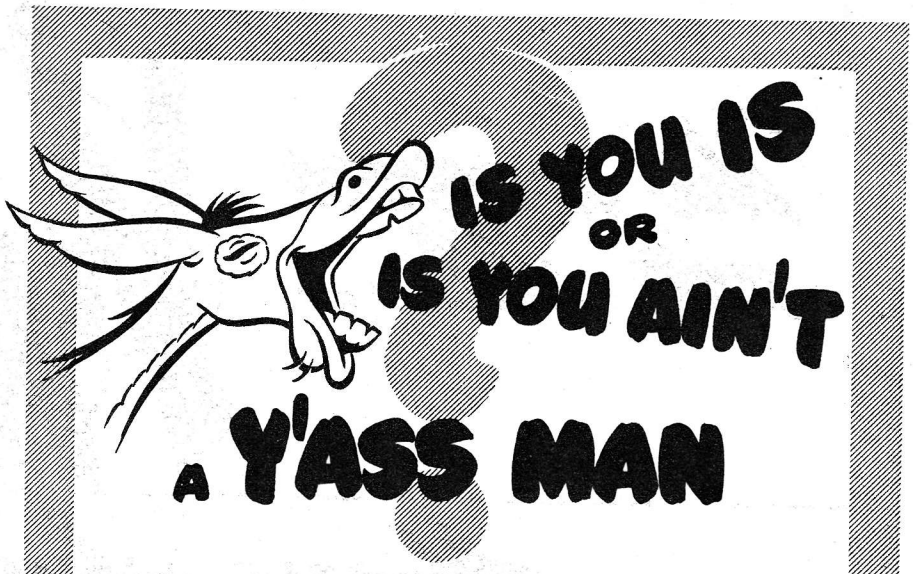
The brass cylinder is part of the carburetor body—like your head is part of yours. In other words if you damage the cylinder you can't replace it without replacing the whole casting. That's why you have to treat it with care and will not try to remove it.

MAIN NOZZLE

This is another part of the carburetor where it pays to be on the alert. Looking down the air horn of the carburetor like you were looking for an adams apple, you'll see the main nozzle. At the tip of it you'll find one flat side. This flat side must face **up** when the nozzle is in place. When it's facing up—the small bleed hole in the nozzle will also face up—into the air stream and that's what is important. This same nozzle must be installed with **one** copper gasket. Never two gaskets because this would let it dribble gas like the fuel level was too high. And never leave the gasket out or it'll act like too low a fuel level.

We could go on and on, mentioning such things as warped and worn bowl covers—always install new gaskets—don't lose the little metering rod washer—the importance of the small air horn gasket—always use the correct tools (especially screwdrivers)—how to clean carburetors—but we won't. After all, you know about these things already and if you don't you can always check any hazy points with the instruction sheet included with each parts kit. Main thing is to feed your carburetor with the proper parts kit—seasoned with plenty of savvy.

x y z



1. Should generators be repolarized everytime the wires have been removed from the generator or regulator or battery?

2. The drain valves on Ford fuel pumps must be tight. If they aren't, would you say fuel consumption may increase?

3. If old battery plates can't be repaired is there any reason why you shouldn't toss them away?

4. Is the amperage in the secondary circuit of the ignition system lower than the amperage in the primary circuit?

5. Is it true the engine can't cause the upper portion of the spark plug porcelain to break?

6. Do you ever pump the foot throttle when you're starting an engine?

7. When cleaning ball bearings, compressed air should be used?

8. When cleaning spark plugs with an air blast cleaner is it necessary to brush, file or scrape the electrodes?

9. Spark plug gaps are adjusted accurately at the factory but—is it necessary to readjust new plugs before installing them in an engine?

10. Is it harmful to clean dirt and corrosion off battery cable terminals with a wire brush?

The Answer is.....on the next page

The answers are all... YES

To the questions on the preceding page.

Here's why...

1. If the generator is operating when the polarity of the fields does not correspond with the battery polarity, both generator and cut-out relay are liable to cook. That's why you don't take chances —repolarize everytime.

2. Could be. If the valve doesn't seal properly, gasoline may leak out of the pump. Loose drain valves will very often prevent the pump from operating at all. Two very good reasons for always making sure the valve is tight.

3. There sure is. Old battery plates should go to salvage—but first knock out all of the active material. The metal in the grids can be melted down and used over again.

4. But yes. The battery voltage forces current through the primary winding of the coil. This low voltage is transformed to a higher voltage and lower current value in the secondary winding of the coil.

5. Yes, yes, yes. Ninety-nine times out of a hundred the upper part of the spark plug is broken by using the wrong wrench to remove or install plugs—or using the proper tool wrongly. The other one per cent get broken when somebody with butter fingers lets them fall.

6. Ha! We caught you this time because naturally you said "Yes", even though you know it's the wrong thing to do. Pumping wet gasoline into the cylinder often makes the engine harder to start— plus washing the oil off the cylinder walls and increasing wear and crankcase dilution.

7. Yes—but it should be used in a special way. Never allow the bearing to spin because spinning a dry bearing can wear it out in no time. When using compressed air—hold the balls and race so it won't spin.

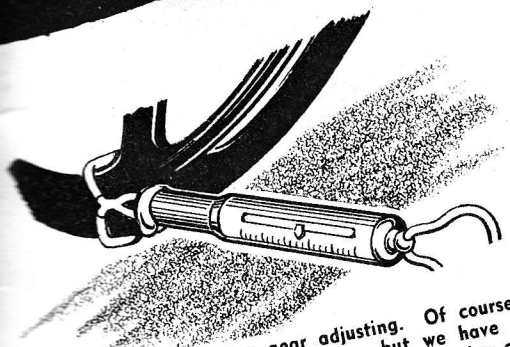
8. Definitely yes. Sand blast cleaners will not remove all of the oxidization off of the electrodes. After sand blasting, the tips of electrodes should be cleaned with a contact point file or a piece of emery cloth.

9. Yes. Spark plug gaps are usually adjusted to .025" at the factory. Some engines require gaps of .030", or wider—therefore they must be readjusted before installing.

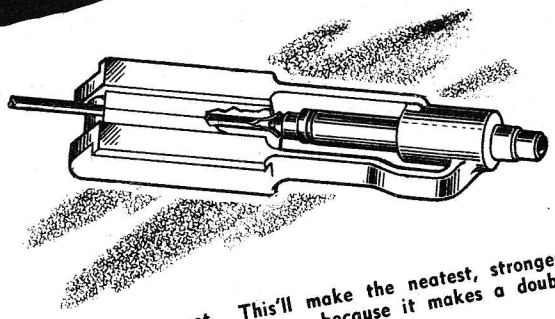
10. It is. Battery cable lugs are usually made of brass and are lead plated to retard corrosion. A steel brush will remove the plating. Using a wire brush around the top of the battery may result in an explosion if flying sparks ignite the hydrogen gas. The proper method of cleaning the lugs is to wash them in a strong solution of soda and water.

Acq # wm 1981-597/59

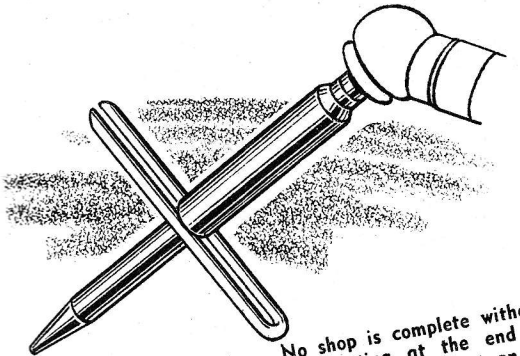
Shop Tools...



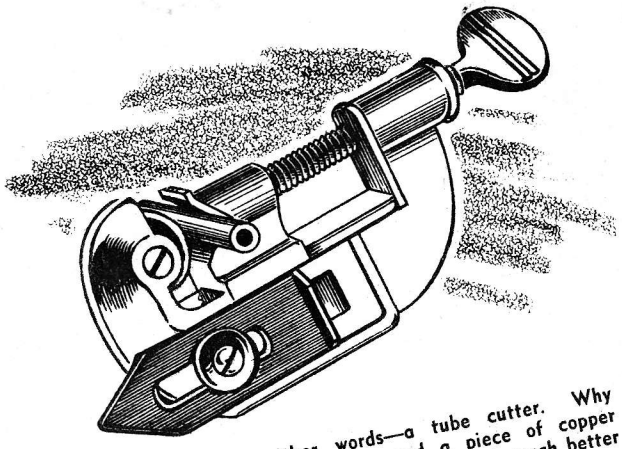
Scales, tension, steering gear adjusting. Of course you can always use your little finger - but we have never seen one that's as sensitive as this spring tension gauge. Not for checking steering anyway.



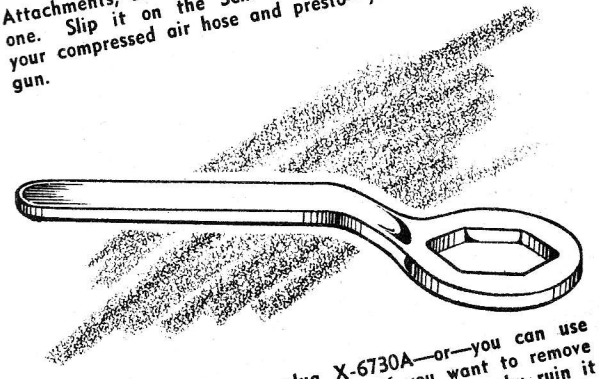
Flarers, tube, set. This'll make the neatest, strongest flare you ever laid eyes on because it makes a double fold on the end of the tubing.



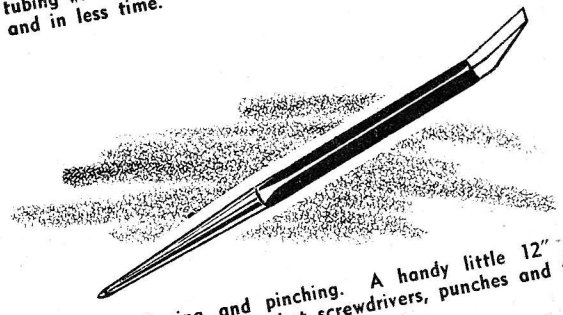
Attachments, air blowing. No shop is complete without one. Slip it on the Schrader fitting at the end of your compressed air hose and presto—you've got an air gun.



Cutters, tube—in other words—a tube cutter. Why fight with a hacksaw, a file and a piece of copper tubing when this little gadget will do the job much better and in less time.



Ford, wrenches, drain plug X-6730A—or—you can use stillsons, pipe wrenches or pliers if you want to remove the oil pan drain plug the hard way. But why ruin it for someone else who wants to use the correct wrench.

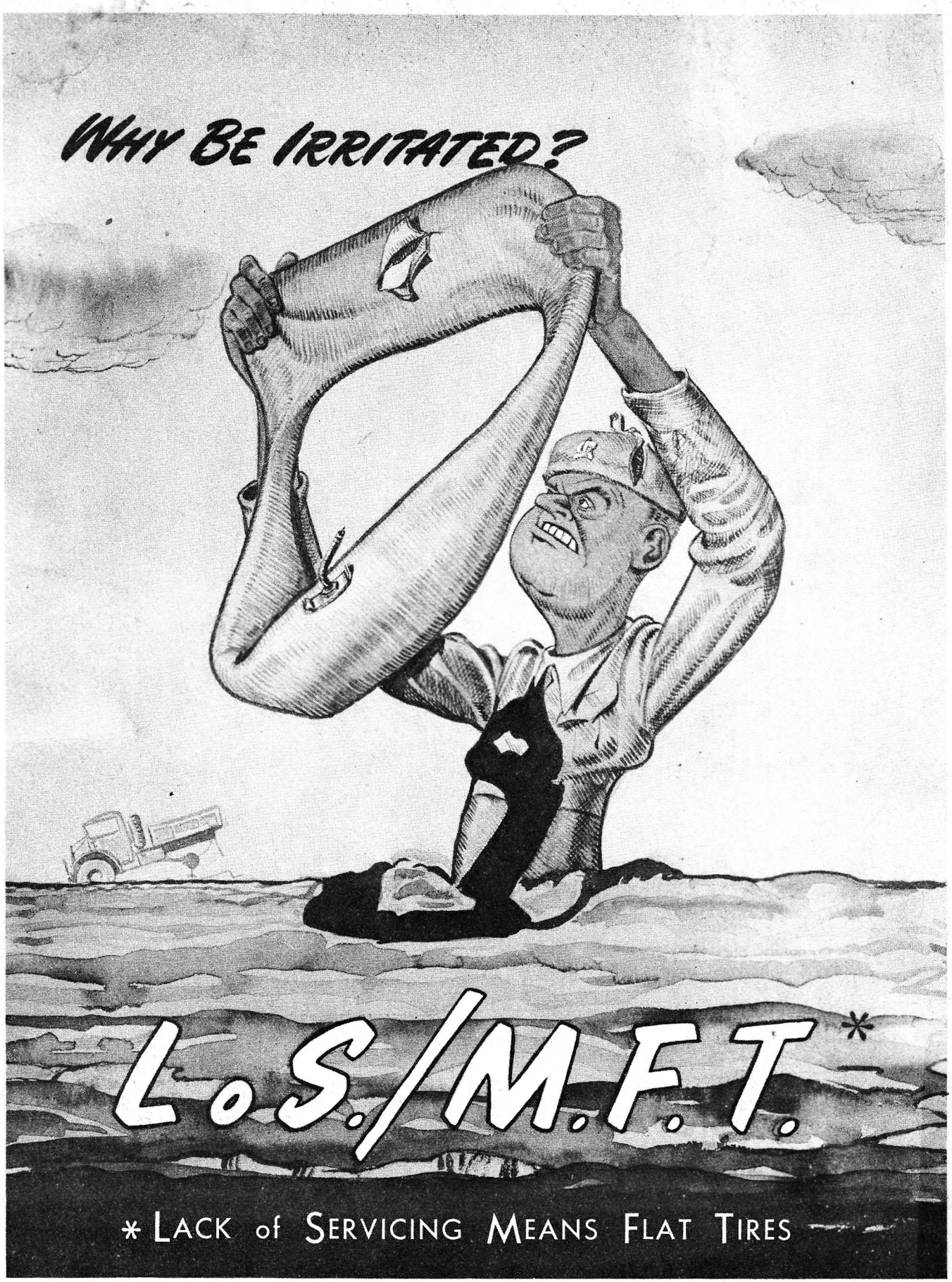


Bars, aligning and pinching. A handy little 12" bar designed to do jobs that screwdrivers, punches and files are not supposed to be used for.

USE THE RIGHT TOOLS and USE THE TOOLS RIGHT

LIFE can be sweeter if you meet every tool in your shop. Knowing its name, what it can be used for and what it shouldn't be used for, will save you time, energy, broken knuckles and blasphemy.

How about casting your critical eye over these little tools? Any of 'em you haven't met before? If you haven't, you should have, because they're on the scale of issue for all Workshops and Units. If they should be in your tool crib and aren't—all you have to do is indent for them in the regular manner



WITH SUITABLE APOLOGIES